

Simplifying radicals--Method 2

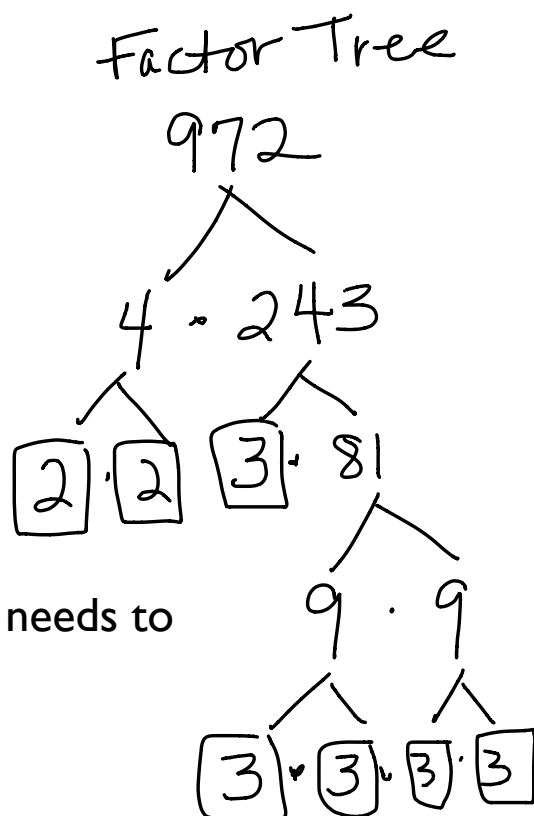
$\sqrt[3]{686}$ → Means "what # times itself 3 times equals 686"

$\sqrt[5]{1344}$ → Means "what # times itself 5 times equals 1344"

$\sqrt{972}$ is the same as $\sqrt[2]{972}$

Step 1: Use a factor tree to write the prime factorization of the number. This means to find all the prime numbers that equal that number.

$$\sqrt{972}$$
$$\sqrt{2 \cdot 2 \cdot 3 \cdot 3 \cdot 3 \cdot 3}$$



Step 2: The root number tells You how many of each number needs to Be grouped together.

$$\sqrt[3]{972}$$

This is the

root #. So group
pairs of the same number

$$\sqrt{(2 \cdot 2)(3 \cdot 3)(3 \cdot 3) \cdot 3}$$

Step 3: Once you group them then take one number from each group (or circle) and write it outside the radical symbol. In this example, there is a pair of twos...so do $\sqrt{2 \cdot 2}$ which would equal 2.

$$\sqrt{(2 \cdot 2)(3 \cdot 3)(3 \cdot 3) \cdot 3}$$

This 3 is not grouped so it must stay inside the radical symbol

$$2 \cdot 3 \cdot 3 \sqrt{3}$$

$$18\sqrt{3}$$

So the $\sqrt{972}$ simplified would be $18\sqrt{3}$

Ex: Simplify $\sqrt[3]{686}$

$$\begin{array}{c} 686 \\ \wedge \\ \square \dots \end{array}$$

$$\sqrt[3]{686}$$

$$\begin{array}{c} \boxed{7} \cdot 98 \\ \swarrow \searrow \\ \boxed{2} \cdot 49 \\ \swarrow \searrow \\ \boxed{7} \cdot \boxed{7} \end{array}$$

$$\sqrt[3]{2 \cdot \boxed{7 \cdot 7 \cdot 7}}$$

Tells us to circle numbers that appear in threes

$$7 \sqrt[3]{2} \left. \vphantom{\begin{array}{c} 7 \\ \sqrt[3]{2} \end{array}} \right\} \begin{array}{l} \text{Final} \\ \text{answer} \\ \text{in} \\ \text{Simplest} \\ \text{form} \end{array}$$

Ex: Simplify $\sqrt[5]{1344}$

$$\sqrt[5]{1344}$$

$$\sqrt[5]{\boxed{2 \cdot 2 \cdot 2 \cdot 2 \cdot 2} \cdot 2 \cdot 3 \cdot 7}$$

$$2 \sqrt[5]{2 \cdot 3 \cdot 7}$$

$$2 \sqrt[5]{42}$$

$$\begin{array}{c} 1344 \\ \swarrow \searrow \\ 4 \cdot 336 \\ \swarrow \searrow \quad \swarrow \searrow \\ \boxed{2} \cdot \boxed{2} \cdot 6 \cdot 56 \\ \swarrow \searrow \quad \swarrow \searrow \quad \swarrow \searrow \\ \boxed{2} \cdot \boxed{3} \cdot \boxed{7} \cdot 8 \\ \quad \quad \quad \swarrow \searrow \\ \quad \quad \quad \boxed{2} \cdot 4 \end{array}$$

$$\text{so } \sqrt[5]{1344} = 2\sqrt[5]{42}$$

$$\sqrt[2]{2} \cdot \sqrt[2]{2}$$